

Evidence Summary: Low Back Pain Medical Treatment Guidelines

This table contains summaries of the critiques that were completed for individual scholarly articles used in the Low Back Pain Medical Treatment Guidelines. Scholarly articles were given an assessment of “adequate,” “inadequate,” or “high quality.” When Division of Workers’ Compensation staff completed additional statistical pooling, this is noted in the “Division Staff Assessment Column” using RevMan (Cochrane Collaboration of Systematic Reviews). These are denoted with a **. In multiple cases, literature from the Cochrane Collaboration was reviewed.

It should be noted that one scholarly article may be graded at different levels for different interventions. For those deemed inadequate, a brief rationale is provided. The criteria for the aforementioned assessment designations are located on the Division of Workers’ Compensation Website: www.colorado.gov/pacific/cdle/guidelines-methodology-article-critiques. Or alternatively, www.colorado.gov/cdle/dwc (then go to “Treatment Guidelines”).

The articles that are graded as either adequate or high quality are then translated into “**some evidence**,” “**good evidence**,” and “**strong evidence**” as defined in the General Guidelines Principles, located in each of the Division Medical Treatment Guidelines.

- “Some” means the recommendation considered at least one adequate scientific study, which reported that a treatment was effective. The Division recognizes that further research is likely to have an impact on the intervention’s effect.
- “Good” means the recommendation considered the availability of multiple adequate scientific studies or at least one relevant high-quality scientific study, which reported that a treatment was effective. The Division recognizes that further research may have an impact on the intervention’s effect.
- “Strong” means the recommendation considered the availability of multiple relevant and high-quality scientific studies, which arrived at similar conclusions about the effectiveness of a treatment. The Division recognizes that further research is unlikely to have an important impact on the intervention’s effect.

Because we synthesize the medical evidence as much as possible, one assessment (or group of assessments) may potentially create more than one evidence statement. It is also possible that two assessments may be combined (eg. two “adequates” to create a higher level of evidence, (for example, elevating a statement from “some” to “good” evidence). It should also be noted that some

scholarly literature that focuses on the cervical spine may also be clinically applicable to care of the injured worker with disorders of the lumbar spine.

This evidence table is a *summary* and based on critiques of scholarly articles. The full critiques are publicly available on the Division of Workers' Compensation Website. www.colorado.gov/cdle/dwc.

Author/Year	Intervention	Design	Population/Sample/Setting	Main Outcome Measure(s)	Author(s) Conclusion(s)/Discussion	Division Staff Assessment
Diagnostic Procedures						
Carragee, et al. 2009	Provocation Discography	Prospective Matched Cohort Study	N=150. Mean age-40. Without Current Low Back Pain. Patients recruited from 3 earlier studies	Status of the disc at the end on MRI taken 10 years after	Small Bore Needle puncture from Discogram can increase frequency of progression of disc degeneration after 10 years.	Adequate [additional reference(s) reviewed]
Related Evidence Statement: <i>There is some evidence that discography with a small-bore needle increases the risk of later disc herniation at the injected level, and this risk should be taken into account when deciding on a referral for discography.</i>						
Carragee, et. al. 2000	Provocation Discography	Prospective Cohort Study	N=38. Mean Age: 42. Pain management and functional restoration clinics at Stanford.	Numerous analyses, including VAS	Individuals with emotional, psychological, and chronic pain problems are likely to be at risk of persistent pain after discography. It should not be done in setting of somatoform disorder or other situations in which there is significant psychological distress	Adequate
Related Evidence Statement: <i>There is some evidence that discography in patients with somatoform disorders is likely to create a risk of development of persistent low back pain in the year following the procedure</i>						
Carragee et al. 2006	Provocative Discography	Prospective evaluation of the performance of a diagnostic test.	N=62. Mean age 43. Patients undergoing spinal fusion. Stanford University	Gold standard for the accuracy of the diagnostic test (discography vs radiographic spondylolisthesis) was success of fusion	Positive discography, which is advocated as a test which identifies patients with discogenic pain, does not effectively identify patients who recover when the alleged pain generator is removed.	High Quality
Related Evidence Statement: <i>There is good evidence that a positive discogram does not predict positive results from a fusion with the same success rate as documented spondylolisthesis (27% success rate compared to 72% success rate)</i>						
Jarvik, et	Imaging	Prospective	N=148. Mean age 54.	Pain frequency and pain	Findings associated with prior LBP (disc	High Quality

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al, 2001		cohort study	Patients randomly selected from several musculoskeletal clinics	bothersomeness questionnaires.	extrusion, nerve root compromise) are properly called “abnormalities” Findings not associated with LBP but associated with aging (disc bulges, desiccation, loss of disc height) are so common in asymptomatic patients that it may be misleading to call them abnormalities	
Related Evidence Statement: <i>There is good evidence that in the asymptomatic population, disc bulges, disc protrusions, annular tears, high intensity zone areas, and disc height loss are prevalent 40–60% of the time, depending on the condition, study, and age of the patient</i>						
Kendrick, et al. 2001	Radiography	Randomized Trial	N=421; median age 39. Patients with low back pain from general practices within the United Kingdom.	Roland-Morris Disability Scores	-XR of L-spine associated with greater proportion of ongoing LBP at 3 months, with worse overall health scores, and no better functional scores.	Adequate
Related Evidence Statement: <i>There is some evidence that early radiographic imaging without clear indications is associated with prolonged care, although it does not change functional outcomes</i>						
Mahmud, et al. 2010	Functional Capacity Evaluation	Meta-analysis of randomized controlled trials	Injured workers or claimants of workers’ compensation. -- Databases were searched through December 2009 and included the Cochrane Central Register of Controlled Trials, MEDLINE, EMBASE, CINAHL, PsycINFO, and PEDro	Any re-injury outcome measures after functional evaluation, such as time for RTW, days on sick leave, or duration of workers’ compensation claims	-No studies were found which compared FCE to no intervention -Low quality evidence was found from one study that short form FCE results in similar recurrence rates to long form FCE; even though the study met nearly all criteria for validity, the overall findings were rated as low quality, since only one study was found	High Quality- additional references reviewed
Related Statement: <i>A full review of the literature reveals that there is no evidence to support the use of FCEs to prevent future injuries</i>						
Matheson, et al. 2002	Functional Capacity Evaluation (FCE)	Retrospective Study	N=650. Mean age 41.5. Individuals not working due to functional limitation. Canada	Measures of lifting ability. Time off work	The amount of time a worker was off from work and gender were the 2 factors that had the strongest relationships to whether or not a person returns to work,	Adequate

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					and time off work had the stronger relationship of the two. The amount of weight lifted from floor to waist was also related to return to work. This study showed that the greater the lifting ability, the greater the likelihood of return to work. All other performance variables did not provide any additional predictive power to the logistic regression model.	
Related Evidence Statement: <i>There is some evidence that time off work and gender are important predictors for return to work, and floor-to-waist lifting may also help predict return to work, however, the strength of that relationship has not been determined</i>						
Willems, et al. 2012	Tests predicting success of spinal fusion	Systematic review of prognostic studies	Patients undergoing spinal fusion. -Databases were PubMed and EMBASE through November 2010	Outcomes: pain, improvement, work disability, back-specific disability, reported in such a way that a relevant clinical cutoff could be defined and dichotomized into success and failure for the fusion operation	There was risk of bias in most of the selected studies, which precludes firm conclusions from their reported findings	Adequate
Related Evidence Statement: <i>There is some evidence that provocative discography, facet joint blocks and temporary external transpedicular fixation do not adequately screen patients with nonspecific low back pain for fusion success. The tests tend to be sensitive but not specific</i>						
Non-Operative Treatment						
Albert HB, et al., 2013	Antibiotic treatment	Randomized clinical trial.	N=162. Mean age 45. Treated for chronic low back pain. University setting –Denmark.	Clinical Evaluations @ baseline & post one year.	Modic type 1 changes, antibiotic treatment demonstrates statistically & clinically significant benefits over placebo.	High Quality [additional reference(s) reviewed]
Related Evidence Statement: <i>There is good evidence from one study that chronic pain patients with Modic type 1 changes in discs adjacent to the initial disc herniation after 6 months of treatment can experience decreased pain and disability after a 100 day course of amoxicillin-clavulanate (one or two 500mg/125mg 3x per day)</i>						
Aure, et al. 2003	Manual Therapy.	Randomized Clinical	N=49. Mean age- 40. Patients on sick leave for	Spinal range of motion. Oswestry; general	Manual therapy and exercise therapy are both effective interventions for chronic	Adequate

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	Exercise Therapy	Trial	low back pain. University setting in Norway	health, and return to work.	nonspecific low back pain. -Manual therapy is more effective than exercise therapy in reducing pain, improving function, enhancing general health, and reducing sick leave.	
Related Evidence Statement: <i>There is some evidence that manipulation/mobilization, including thrust techniques, may provide additional benefits on pain and function when used to supplement an individually tailored exercise program</i>						
Balthazard, et al. 2012	Manual Therapy/Active exercise	Randomized Clinical Trial	N=42, ages 20-65 with non-specific LBP, recruited from rheumatology clinic	VAS pain scale and Oswestry disability	Manual therapy followed immediately by active therapy accelerates recovery.	Adequate
Related Evidence Statement: <i>There is some evidence that manual therapy, followed by active exercises, may be effective for the reduction of disability from nonspecific low back pain lasting more than 12 weeks</i>						
Behrend, 2012	Smoking cessation	Prospective cohort study	5333 patients mean age 52.4) seen for cervical or lumbar spine care at two academic hospital centers at Universities of Florida and Texas	Oswestry	Smokers reported more pain than nonsmokers Smoking cessation prior to treatment or during the course of care was related to a greater improvement in reported pain compared to current smoking	adequate
Related Evidence Statement: <i>There is some evidence that patients who smoke respond less well to non-operative spine care and that quitting smoking results in greater improvement</i>						
Brinkhaus B et al. 2006	Acupuncture	Randomized Clinical Trial	N= 298; mean age 59. Low Back Pain accord to VAS I past 7 days and use of only NSAID for pain in past 4 weeks.	Difference in VAS (pain relief) between baseline and 8 weeks	Acupuncture provides significant pain relief compared to no acupuncture for chronic low back pain Design was compromise between flexibility (desired by acupuncturists) and reproducibility (desirable for researchers)	Adequate; Inadequate regarding establishing that there is no difference between true and sham acupuncture.
Related Evidence Statement: <i>There is good evidence that both acupuncture and sham acupuncture are superior to usual care without acupuncture for moderate short-term and mild long-term alleviation of low back pain, neck pain, and the pain of joint osteoarthritis.</i>						
Butterman, et al. 2004	Epidural Steroid Injection and Discectomy	Randomized Clinical Trial	N=100. Mean age-40. Patients with disc herniation	Residual motor deficits on Oswestry; Lower Extremity pain; painful	Most patients were referred for treatment of disc herniation; thus the study does not define natural history of herniated disc.	Adequate

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			encompassing at least 25% of cross-sectional area.	area on pain diagram	-Because 69 of the 169 patients referred for treatment improved with 6 weeks of conservative tx, a minimum of 6 weeks of conservative tx is reasonable prior to invasive treatment with ESI or surgery.	
Related Evidence Statement: <i>There is some evidence that after 6 weeks of conservative therapy for large herniated discs, an epidural injection may be attempted, as it does not compromise the results of a discectomy at a later date.</i>						
Cherkin, et al. 1998	Physical Therapy, Education Booklet, Chiropractic Care	Randomized Controlled Trial	N=323. Mean age 41. Patients with low back pain at Group Health Cooperative of Puget Sound in Seattle	"Bothersomeness" of symptoms; and modified Roland-Morris Disability.	McKenzie PT and chiropractic manipulation produce marginal outcome advantages over booklet alone.	Adequate
Related Evidence Statement: <i>Some evidence that referral of patients in the first weeks of uncomplicated low back pain adds little to the otherwise favorable prognosis for acute low back pain and does incur additional short-term costs of care</i>						
Cherkin et al. 2009	Acupuncture, Simulated Acupuncture, usual care	Randomized Clinical Trial	N=638. Mean age 47. With chronic low back pain. Kaiser & Group Health Cooperative in Seattle WA	VAS scale and Roland Morris Disability Scale	Compared to usual care, individualized, standardized, and simulated acupuncture led to greater improvements in pain bothersomeness and disability at 8 weeks	High Quality
Related Evidence Statement: <i>There is good evidence that acupuncture, true or sham, is superior to usual care for the reduction of disability and pain in patients with chronic nonspecific low back pain, and that true and sham acupuncture are likely to be equally effective</i>						
Cho, et al. 2013	Acupuncture	Randomized Clinical Trial	N=116. Mean age: 42. Patients with Low Back Pain. University Dept in South Korea	VAS "bothersomeness" score.	There is evidence that acupuncture at traditional meridian points individualized to the patient is more effective than sham acupuncture in reducing pain bothersomeness and pain intensity for nonspecific LBP	High quality (additional references reviewed).
Related Evidence Statement: <i>There is good evidence that true acupuncture at traditional medians is marginally better than sham acupuncture with blunt needles in reducing pain, but effects on disability are unclear</i>						
Choi et al. 2013	Epidural Steroid Injections	Meta-analyses of Randomized Clinical	databases included MEDLINE, EMBASE, and the Cochrane Library through September	Pain scores.	ESI is no more effective than control interventions in improving pain or disability scores in the long term. ESI is no more effective than control	Inadequate

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		Trials. Patients with low back pain and radiculopathy regardless of duration	2011		interventions in reducing the need for surgery in back pain with radiculopathy	
Clarke et al 2007 <i>Cochrane Collaboration</i>	Traction	Systematic Review of randomized controlled trials	Adults with non-specific low back pain: acute, subacute, or chronic with or without sciatica. –Databases: MEDLINE, EMBASE, CINAHL, and the Cochrane Library from inception until updated through October 2006	Cochrane Risk of Bias Tool. Studies classified as : strong, moderate, limited.	The main result is that traction is no more effective than placebo, sham, or no treatment	High Quality
Related Evidence Statement: <i>There is good evidence that mechanical traction is not useful for low back pain patients with sciatica nor those with low back pain without radicular symptoms</i>						
Cleland, et al. 2009	Manual physical therapy techniques	Randomized Clinical Trial	N=112. Mean age: 40. Patients treated for low back pain at military and university settings in the US	Oswestry, the Numerical Pain Rating Scale, and a questionnaire regarding side effects since the first treatment session	Clinical prediction rule used for patient selection into the study is likely to identify patients who will benefit from thrust manipulation of the low back	High Quality
Related Evidence Statement: <i>There is good evidence that two sessions of thrust manipulation of the thoracolumbar spine followed by an exercise regimen leads to better low back function at six months than oscillatory non-thrust manipulation in patients with subacute low back pain. The study found patients with the following characteristics were likely to benefit from the program: segmental hypomobility, no symptoms distal to the knee, low fear-avoidance scores, and preservation of at least 35 degrees of internal rotation in at least one hip</i>						
Cramer, et al 2013	Yoga	Meta-analysis of randomized clinical	Databases were MEDLINE, EMBASE, the Cochrane Library, PsycINFO, and	Risk of Bias based on Cochrane Review Back Group.	Strong evidence in favor of yoga for short-term effects; Moderate evidence in favor of yoga for long-term effects.	Adequate. Additional references reviewed.

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		trials	CAMBASE, searched through January 2012, along with reference lists of original articles. Adults with low back pain			**Additional statistical pooling done.
Related Evidence Statement: <i>There is strong evidence that yoga has small to moderate advantages over an educational booklet only in reducing low back pain and back specific disability but no evidence that yoga is superior to stretching and strengthening classes led by a physical therapist</i>						
Currie et al, 2000	Cognitive-Behavioral Treatment (CBT)	Randomized Clinical Trial	N=60. Mean age 45. Patients treated for insomnia in a facility in Ottawa.	Categories based on sleep diaries	CBT can relieve insomnia secondary to chronic pain. Even though complete remission of insomnia was not attained by most patients in the CBT group, it was possible to reduce the severity of insomnia with non-pharmacological interventions	Adequate
Related Evidence Statement: <i>There is some evidence that CBT provided in seven two-hour small group sessions can reduce the severity of insomnia in chronic pain patients</i>						
Dagenais, 2007 <i>Cochrane Collaboration</i>	Prolotherapy	Systematic review of Controlled Clinical Trials	Adults with history of non-specific low back pain. - Databases included MEDLINE, EMBASE, CINAHL, AMED, and the Cochrane Central Register of Controlled Trials through October 2006	Low back pain, low back disability, general/overall improvement or satisfaction with treatment, well-being measured by SF-12, return to work, physical examination findings, medication/health care use	- Even with studies of generally high quality, it is difficult to interpret evidence of the efficacy of prolotherapy injections for low back pain	High Quality
Related Evidence Statement: <i>there is good evidence that prolotherapy by itself is not an effective treatment for chronic low back pain</i>						
Dobsha, et al. 2009	Collaborative Care for Chronic Pain	Cluster randomized trial	Patients with musculoskeletal pain diagnosis. 42 clinicians treating patients in the Veteran's	Roland Disability score	Collaborative care intervention for chronic pain was significantly more effective than treatment as usual across a variety of outcome measures	Adequate -other references reviewed

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			Administration in Portland Oregon.			
Related Evidence Statement: <i>There is good evidence that interdisciplinary programs which include screening for psychological issues, identification of fear-avoidance beliefs and treatment barriers, and establishment of individual functional and work goals will improve function and decrease disability</i>						
Ernst et al 2011	Acupuncture	Systematic Review of Systematic Review	57 Systematic reviews. Literature searches	Predefined criteria from a 1991 article on systematic reviews were used to evaluate the quality of the systematic reviews	Of the 57 systematic reviews (SR) included in the study, only 4 were judged to be excellent	Adequate
Related Evidence Statement: <i>There is good evidence that both acupuncture and sham acupuncture are superior to usual care without acupuncture for moderate short-term and mild long-term alleviation of low back pain, neck pain, and the pain of joint osteoarthritis</i>						
Fishman, et al, 2002	BOTOX and physical therapy	Randomized Clinical Trial	N=67. Mean age 57. Patients with piriformis syndrome	50% pain reduction on VAS	BTX was more effective in treating piriformis syndrome than either placebo or triamcinolone plus lidocaine	Adequate
Related Evidence Statement: <i>There is some evidence to support injections for electromyographically proven piriformis syndrome</i>						
Fu, et al. 2013	Recombinant Human Bone Morphogenetic Protein-2 in Spine Fusion (RhBMP-2)	Meta-analysis of randomized clinical trials and cohort studies	Patients undergoing spinal fusion in trials sponsored by Medtronic, the manufacturer of INFUSE (rh-BMP-2)	Rating of the strength of evidence was based on risk of bias, consistency, directness, and precision of the data	In spinal fusion, rh-BMP-2 and ICBG seem to be similarly effective when used in ALIF and PLF; current evidence precludes conclusions about effectiveness in other surgical approaches	High Quality [additional reference(s) reviewed]
Related Evidence Statement: <i>good evidence that rhBMP has no clinically important advantage over bone graft for anterior lumbar interbody fusion or posterior lumbar fusion</i>						
Fukusaki, et al 1998	Epidural Steroid Injection	Randomized Clinical Trial	N=53. Mean Age: 70. Patients with pseudoclaudication and leg pain at a University anesthesiology department in Japan.	Walking distance	Epidural anesthetic block has short-term beneficial effect on pseudoclaudication in lumbar degenerative stenosis, but addition of steroid confers no additional benefit	Adequate
Related Evidence Statement: <i>There is some evidence that translaminal steroid injections do not increase walking tolerance for those with spinal stenosis compared to local anesthetic</i>						

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Furlan, et al. 2008 <i>Cochrane Collaboration</i>	Massage	Systematic Review of Controlled Clinical Trials	Databases included Cochrane Central Register of Controlled Trials, MEDLINE, CINAHL, EMBASE through 2008, HealthSTAR through 2006, hand search of reference lists in review articles and guidelines, and contact with experts in massage therapy and spine disorders. Patients with non-specific back pain between the 12 th rib and inferior gluteal fold.	Various risk of bias criteria. Levels of evidence as defined by study design, consistency of findings, directness (generalizability), precision of results, and risk of bias	Massage may be beneficial for patients with subacute and chronic low back pain, especially if combined with exercise and delivered by a licensed therapist	Adequate
<p>Related Evidence Statements:</p> <ul style="list-style-type: none"> • <i>There is good evidence that massage therapy in combination with exercise reduces pain and improves function short-term for patients with sub-acute low back pain</i> • <i>There is some evidence that massage may be beneficial for low back pain, especially when combined with exercise</i> 						
Haake, et al. 2007	Acupuncture	Randomized Clinical Trial	N-1162; Mean age-50. University of orthopedics and pain management in Germany	A "response" was defined as a 33% or better improvement on 3 pain-related items on the Von Korff CPGS or as a 12% or better improvement on the Hanover Functional Ability Questionnaire, taken at the 6 month follow-up assessment	-The unexpected similar findings of effectiveness in the true and sham acupuncture groups raises questions about the underlying mechanism of acupuncture and whether the emphasis on learning the traditional Chinese acupuncture groups may be superfluous	High Quality
<p>Related Evidence Statement: <i>There is good evidence that both acupuncture and sham acupuncture are superior to usual care without acupuncture for moderate short-term and mild long-term alleviation of low back pain, neck pain, and the pain of joint osteoarthritis</i></p>						

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Hagen, et al. 2000	Light mobilization program	Randomized controlled trial	N=510. Sick-listed for 8 weeks or more	Full-compensation sick days	Education & reassurance, combined with encouragement to resume activity, reduce sickness compensation days and accelerate return to full duty work	High Quality
Related Evidence Statement: <i>There is strong evidence against the use of bed rest in acute low back pain cases without neurologic symptoms</i>						
Haimovic, et al. 1986	Dexamethasone	Randomized clinical trial	N=33. Patients with at least 1 qualifying symptom and 1 qualifying sign of lumbosacral radicular pain. Cornell University Neurology Service	7-point scale, neurologic exam, lost work days, straight-leg raise.	Dexamethasone not superior to placebo in lumbosacral radicular pain	Inadequate: treatment effects obscured; power eroded by dichotomizing responses into yes/no categories.
Hay, et al. 2015	Physical Treatments vs a pain management program	Randomized Clinical Trial	N=402. Mean age 40.6. Patients with Low Back Pain in general practices in the UK.	Self-completed Roland Morris Disability Questionnaire (RMDQ)	The RMDQ change scores did not differ between groups at both 3 and 12 months of follow-up.	Adequate
Related Evidence Statement: <i>There is some evidence that a 2 day course focusing on the biopsychosocial model with an emphasis on the goals of returning to usual activities and fitness is as effective in reducing disability as six sessions of manual therapy sessions provided by physiotherapists and more limited patient education</i>						
Heffmans et al. <i>Cochrane Collaboration</i>	Back Schools	Systematic review of randomized clinical trials	Patients age 16 – 70 with nonspecific low back pain.	Return to work or days off work; VAS; Functional status (Oswestry or Roland-Morris).	There is moderate evidence that back schools in an occupational setting seem to be more effective than other treatments for patients with recurrent and chronic LBP There is a need for high-quality RCTs of back schools to determine which kind of back school is most effective	High Quality [additional reference(s) reviewed]
Related Evidence Statement: <i>There is some evidence of a modest benefit from adding a back school to other treatments such as NSAIDs, massage, transcutaneous electrical nerve stimulation (TENS), and other physical therapy modalities</i>						
Hoffman, et al. 2007	Psychological Interventions	Meta-analysis of controlled trials	Adults with non-malignant chronic low back pain lasting at least 3 months. Databases included MEDLINE,	Effect size defined as difference between mean psychological group outcome and control group outcome.	Psychological interventions appear to be superior to wait-list controls for pain intensity and health-related quality of life; and for work-related disability. -There is less superiority of psychological	Adequate (additional reference reviewed); (**additional

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			PsychINFO, EMBASE, CENTRAL, CINAHL through October 2004	Pain intensity was 1 outcome.	over other active interventions	statistical pooling done)
<p>Related Evidence Statement: There is good evidence that biofeedback or relaxation therapy is equal in effect to cognitive behavioral therapy for chronic low back pain;</p> <p>There is good evidence that psychological interventions, especially CBT, are superior to no psychological intervention for chronic low back pain, and that self-regulatory interventions, such as biofeedback and relaxation training, may be equally effective</p>						
Holve, et al. 2008	Oral Steroids	Randomized clinical trial	N=27. Mean age 42.6. Patients presenting with new onset of low back pain	Roland Morris. Medication usage	Patients with acute sciatica showed no significant differences between responses to prednisone and placebo, even though the prednisone patients had a slightly faster relief of symptoms and had fewer epidural injections. There are no dramatic effects of giving prednisone	Inadequate. Even-odd allocation of treatment has a risk of bias due to a lack of allocation concealment.
Hopwood et al. 1993	Lumbar epidural steroid injections (ESI)	Case Series	N=209. Adults treated with ESI for low back pain.	pain scale, activity level, analgesic use, and straight leg raising;	-Employment remained significant when adjusted for other variables, perhaps because of association with less severe pain -Smoking association may be due to lack of exercise/poor health behaviors, or may be direct physiologic effect of nicotine on back	Inadequate- Assessments done by treating physician, creating a risk of bias
Jensen, et al. 2012	Counseling	Randomized clinical trial	N=224. Adults in rheumatological outpatient clinics in Denmark.	Primary outcomes were level of back pain on a scale of 0-10, function by the Roland Morris questionnaire, physical function and body pain subscales of the SF-36, and sick leave as assessed by self-report and by the Danish National Register on	The group with two counseling sessions had greater improvement in the SF-36 body pain, the SF-36 physical function, and maximum oxygen consumption than the control group, and had fewer sick leave days as well One limitation is lack of blinding of assessor and patient, but the randomization was successful	Inadequate- vague description of intervention; clinically unimpressive overall effects of counseling.

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				Public Transfer Payments (DREAM), which captures sick leave periods of more than 2 consecutive weeks		
Khot et al. 2005	Intradiscal steroid therapy	Randomized clinical trial	N=120. Mean age-44.	Oswestry scores. Visual Analog Scale	There is no clinical benefit to intradiscal steroid injection.	Adequate
Related Evidence Statement: <i>There is some evidence that intradiscal steroid injection is unlikely to relieve pain or provide functional benefit in patients with non-radicular back pain therefore, they are not recommended</i>						
Kim, et al. 2010	Intra-articular prolotherapy	Randomized Clinical Trial	N=48. Mean age-patients treated for chronic Sacro-iliac joint pain. Anesthesiology department in Korea	Numerical Rating Scale; Oswestry	Intra-articular prolotherapy provided significant relief from SI joint pain, and its effects lasted longer than a steroid injection of the same joint -patients were required to show a response to a local anesthetic injection prior to being randomized; this increased the specificity of the enrollment to patients likely to have the SI joint as a pain generator	Adequate
Related Evidence Statement: <i>There is some evidence that prolotherapy of the sacroiliac (SI) joint is longer lasting, up to 15 months, than intra-articular steroid injections</i>						
Lamb et al, 2010	Cognitive-Behavioral Treatment	Group Randomized Clinical Trial	N=701. Mean age-54. Patients treated for low back pain	Roland-Morris; Von Korff Scale.	The CBT program was effective in managing subacute and chronic back pain in primary care, at a cost less than half of all competing interventions (manipulation, acupuncture, exercise, and postural approaches)	High Quality
Related Evidence Statement: <i>There is good evidence that six group therapy sessions lasting one and a half hours each focused on CBT skills improved function and alleviated pain in uncomplicated sub-acute and chronic low back pain patients</i>						
Lambeek, et al. 2010	Integrated Care	Randomized Clinical Trial	N=134. Mean age-46. Patients with chronic low back pain in	Return to work; Sick Leave	Integrated care directed at the patients' workplace as well as at the low back pain had a beneficial effect on disability	Adequate

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			Amsterdam and Toronto			
Related Evidence Statement: <i>There is some evidence that an integrated care program including workplace interventions and graded activity teaching that pain need not limit activity is effective in returning patients with chronic low back pain to work, even with minimal reduction of pain</i>						
Lee et al. 2013	Acupuncture	Meta-analysis of randomized clinical trials	Patients with acute or subacute low back pain. Databases included Cochrane Central Register, MEDLINE and EMBASE. Chinese databases and Korean databases were also searched	Pain intensity (VAS or numerical rating scale), global assessment, back-specific function (Roland-Morris, Oswestry), disability (activities of daily living, work absenteeism). Risk of bias assessed using the Cochrane Risk of Bias Tool	Despite an extensive literature search, only 11 studies of acupuncture for acute back pain were obtained. The findings suggest that acupuncture may be more effective than NSAIDs in producing global improvement, but the effect, if any, is small	High Quality (other references reviewed)
Related Evidence Statement: <i>There is good evidence there is a likely, small clinical benefit of acupuncture for acute low back pain and it may be considered an alternative for some patients</i>						
LeClaire, et al. 2001	Radiofrequency facet joint denervation	Randomized controlled trial	N=70. Mean age 46. Patients with over 3 months of low back pain from physiatrists offices in Montreal area	Roland Morris; Oswestry; VAS	Radiofrequency neurotomy did not change low back function in sample studied	Inadequate – small sample size
Machado et al. 2010	McKenzie Method	Randomized clinical trial	N=146. Mean age 46	Pain level scales 0 to 10	Patients with acute LBP generally recover quickly if they receive care which from physicians who are made familiar with evidence-based guidelines The addition of the McKenzie method to this guideline-based care adds little of clinical importance in the acute recovery phase	Inadequate – as evidence for or against McKenzie method (floor effects likely to limit analysis) additional reference reviewed.
MacVicar, et al. 2013	Lumbar transforaminal injection of steroids	Systematic review of published trials.	Patients undergoing transforaminal injections of steroids	Success rate for relief of pain	Effective for a limited number of patients	Inadequate-issue of bias in observational studies

Author/Year	Intervention	Design	Population/Sample/Setting	Main Outcome Measure(s)	Author(s) Conclusion(s)/Discussion	Division Staff Assessment
Malmivara et al. 1995	Bed rest; exercise; ordinary activity	Randomized Clinical Trial	N=186. Mean age 39. Employees in Helsinki	Days of sick leave; Oswestry Disability Index	Workers with acute low back pain recover more quickly with avoiding bed rest and maintaining ordinary activity as tolerated	High Quality
Related Evidence Statement: <i>There is strong evidence against the use of bed rest in acute low back pain cases without neurologic symptoms</i>						
May et al. 2012	Centralization and Directional Preference	Systematic review of observational studies	Databases were MEDLINE, CINAHL, and AMed from 1990 (the date of the first publication of a study of centralization) through June 2011	The two authors independently extracted data and evaluated the prognostic studies using a set of criteria derived from Hudak et al 1996, which scored individual criteria on a scale from 0 (unsatisfactory) up to 3 (completely satisfactory)	Centralization appears to be a favorable prognostic indicator for nonspecific low back pain and for sciatica	Adequate: <i>other references included.</i>
Related Evidence Statement: <i>There is good evidence that centralization is a favorable prognostic factor in low back pain with and without sciatica</i>						
Nath, et al. 2008	Percutaneous facet joint rhizotomy, lumbar.	Randomized Clinical Trial	N=40. Mean age 55. Patients treated for low back pain in Sweden	Global improvement; relief of low back pain, relief of generalized pain, pain in lower limb.	RF neurotomy provided significantly better pain relief than sham RF in a group of patients who could identify a particular component of their pain that was relieved by controlled medial branch blocks	Adequate
Related Evidence Statement: <i>There is good evidence in the lumbar spine that carefully selected patients who had 80% relief with medial branch controlled blinded blocks and then had RF neurotomy will have improved pain relief over 6 months and decreased impairment compared to those than those who had sham procedures</i>						
Ng, et al. 2005	Corticosteroids	Randomized	N=81. Mean age 50. Patients treated for chronic radicular pain in Leicester, UK	Oswestry, VAS, change in walking distance, patient satisfaction	Corticosteroid added no benefit to periradicular injection with bupivacaine for treatment of lumbar radicular pain.	Inadequate <i>(difficulty establishing clear units of benefit. Adequate on another issue.</i>
Related Evidence Statement, <i>There is good evidence that the addition of steroids to a transforaminal bupivacaine injection has a small effect on patient reported pain and disability</i>						
Oesch, et al. 2010	Exercise	Meta-analysis of randomized	Workers with a primary diagnosis of non-specific low back pain. ---	Work disability defined as sick leave days, physician's judgment of	The odds ratio of 0.66 for RTW in the long term means that the odds of improvement in work disability are 34%	Adequate

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		clinical trials	Databases included MEDLINE, PEDro, Cochrane Library, PsycINFO, through 2008	work capability, or numbers of workers returning to full time work (RTW). Databases included MEDLINE, PEDro, Cochrane Library, PsycINFO, through 2008	lower if only usual care, rather than exercise, is given	
Related Evidence Statement: <i>There is good evidence that exercise alone or part of a multi-disciplinary program results in decreased disability for workers with non-acute low back pain</i>						
Patel, et al. 2012.	Lateral branch neurotomy for chronic sacro-iliac pain	Randomized Clinical Trial	N=51. Mean age 57. Patients treated for chronic low back pain in private pain practice in Florida or Wisconsin	Numerical Rating Scale	There is good evidence that cooled RF neurotomy performed in a highly selected population results in better pain relief and functional gains than a sham procedure	High Quality
Related Evidence Statement: <i>There is good evidence that cooled RF neurotomy performed in a highly selected population results in better pain relief and functional gains than a sham procedure</i>						
Peterson, et al.	McKenzie compared with Manipulation	Randomized Clinical Trial	N=N=350. Mean age 37.5. Copenhagen, Denmark	Primary outcome measure was proportion of patients reporting treatment success at 2 months follow-up defined as a reduction of > 5 points or a score below 5 points on the Roland Morris Disability Questionnaire (RMDQ) which spanned 0 to 23 points	Although both groups improved, the McKenzie method appeared to be more favorable in reducing disability.	High Quality
Related Evidence Statement: <i>There is good evidence that a 12 week course of McKenzie therapy is at least as effective as, and may have modestly superior results to, chiropractic manipulation in reducing disability from nonspecific low back pain lasting 6 weeks or more</i>						
Peterson, et al. 2002	McKenzie therapy vs. intensive	Randomized clinical trial	N=160. People with subacute or chronic low back pain, rheumatology	Disability and pain measured by self-reports using a	-The effectiveness of the McKenzie treatment equaled that of intensive dynamic strengthening training in	Adequate

Author/Year	Intervention	Design	Population/Sample/Setting	Main Outcome Measure(s)	Author(s) Conclusion(s)/Discussion	Division Staff Assessment
	strength training		clinic in Sweden.	questionnaire in Manniche's Low Back Pain Rating Scale	reducing disability and pain intensity in patients with subacute or chronic low back pain. The McKenzie treatment has some potential, as compared with strengthening training, in the treatment of chronic low back pain.	
Related Evidence Statement: <i>There is some evidence that the McKenzie method is as effective as intensive dynamic strengthening training in reducing short-term back and leg pain intensity in nonspecific low back pain</i>						
Pinto et al. 2012	Epidural corticosteroid.	Meta-analysis of randomized clinical trials	Patients with sciatica. -- Databases were MEDLINE, EMBASE, International Pharmaceutical Abstracts, CINAHL, and the Cochrane Register of Controlled Trials	Overall pain intensity, leg pain, back pain, and disability. Included VAS, NRS, Oswestry or Roland-Morris.	There is high quality evidence that ESI has small short-term effects on leg pain and disability in patients with sciatica, but these effects are below the thresholds for any clinically important change in pain and disability (10 to 30 points on a 100 point scale)	High Quality (several additional references reviewed)***Additional statistical analyses/pooling done by Division Staff.
2 Related Evidence Statements						
<ul style="list-style-type: none"> Regarding long term benefit from injections, there is strong evidence that epidural steroid injections (ESI) do not, on average, provide clinically meaningful long-term improvements in leg pain, back pain, or disability in patients with sciatica (lumbar radicular pain or radiculopathy) Regarding short term benefits from injections, there is strong evidence that epidural steroid injections have a small average short term benefit for leg pain and disability for those with sciatica 						
Preyde, et al. 2000	Massage Therapy	Randomized Clinical Trial	N-98. Mean age 46. Patients with subacute low back pain treated at a massage therapist's college in Ontario	Roland Disability Questionnaire; Present Pain Index, and Pain Rating Index	In comparison with sham laser and exercise, comprehensive massage therapy group effectively reduces pain intensity and improves function	Adequate
Related Evidence Statement: <i>There is good evidence that massage therapy in combination with exercise reduces pain and improves function short-term for patients with sub-acute low back pain</i>						
Quraishi, et al. 2012	Transforaminal Injections	Meta-analysis of randomized clinical trials	Patients with radicular low back pain. -PubMed and EMBASE from 1966 to 2009, with searches of reference lists of articles and the Current	Standardized mean differences between treatment groups in pain VAS scores and Oswestry Disability Index (ODI) at specified	Transforaminal steroid injections provide greater pain VAS relief (0.2 SD) than control transforaminal injections, but there is no difference in disability measured by the ODI	Inadequate (criteria for selection of study quality not clearly identified; only one author for

Author/Year	Intervention	Design	Population/Sample/Setting	Main Outcome Measure(s)	Author(s) Conclusion(s)/Discussion	Division Staff Assessment
			Controlled Trials Register of the Cochrane Database	time points after the injection		<i>selection analysis). [additional reference(s) reviewed]</i>
Radcliff et al. 2013	Epidural Steroid Injections	Subgroup analysis of a combined randomized and observational clinical trial	N=276, mean age 65	pain and function, measured by the Bodily Pain (BP) and the Physical Function (PF) subscales of the SF-36, and by the Oswestry disability index	Patients with spinal stenosis who had ESI had significantly less improvement than those who did not receive ESI	Inadequate (RCTs combined with observational; crossover issues; consent issues). Adequate on another issue
Riew, et al. 2000	Nerve Root Injections	Randomized Clinical Trial	N=55. Treated for degenerative lumbar pain. St. Louis	Numerical data on whether the patient had surgery	Nerve root injections were successful in avoiding surgery in over half of the operative candidates who entered the study	Adequate
Related Evidence Statement: <i>There is some evidence that the addition of steroids to a transforaminal bupivacaine injection may reduce the frequency of surgery in the first year after treatment in patients with neurologic compression and corresponding imaging findings who also are strong candidates for surgery and have completed 6 weeks of therapy without adequate benefit</i>						
Riew, et al, 2006	Nerve root blocks for radicular pain	Follow-up to an RCT	N=29. Treated for degenerative lumbar pain. St. Louis	Numerical data on whether the patient had surgery	Of the 29 patients who avoided surgery in the first study, only 4 had an operation in the current study	Adequate
Related Evidence Statement <i>There is some evidence that the benefits for the non-surgical group persisted for at least 5 years in most patients, regardless of the type of block given</i>						
Rubinstein, et al. 2011 <i>Cochrane Collaboration</i>	Spinal manipulative therapy	Meta-analysis of randomized clinical trials	Patients with low back pain lasting more than 12 weeks. -Databases from 2000 to 2009 included MEDLINE, Cochrane Library, EMBASE, CINAHL, PEDro, and the Index to Chiropractic Literature	Risk of Bias according to the Cochrane Risk of Bias Review group.	Although SMT was statistically superior to other interventions in pain relief in the short term, these differences were small and clinically unimportant	Adequate

Author/Year	Intervention	Design	Population/Sample/Setting	Main Outcome Measure(s)	Author(s) Conclusion(s)/Discussion	Division Staff Assessment
Related Evidence Statement: <i>There is good evidence that spinal manipulative therapy (SMT) is comparable to exercise, standard medical care, and physiotherapy in reducing chronic low back pain, and good evidence that that SMT does not provide a clinically important superior pain relief over these interventions</i>						
Rubinstein, et al. 2012. <i>Cochrane Collaboration</i>	Spinal manipulative therapy	Meta-analysis of randomized clinical trials	Adult participants with a mean duration of low back pain (LBP) of 6 weeks or less (several exclusions). -Databases included the Cochrane Central Register, MEDLINE, EMBASE, CINAHL, PEDro, Index to Chiropractic Literature through March 2011	Risk of Bias was assessed using Cochrane Risk of Bias Considerations.	In the absence of high quality information from low-bias RCTs, no strong conclusions or recommendations can be made for the use of SMT for acute LBP	High Quality
Related Evidence Statement <i>For acute low back pain, there is good evidence that manipulation does not have a clinically greater therapeutic effect on acute, 6 weeks or less, nonspecific low back pain than other interventions including physical therapy</i>						
Staal, et al. 2008 <i>Cochrane Collaboration</i>	Injection therapy	Systematic Review of Randomized Trials.	Patients aged 18-79. -Databases were MEDLINE, EMBASE, and Cochrane CENTRAL through March 2007, with citation tracking of studies found by the search strategy	based on the Cochrane Back Review Group,	There is no strong evidence to support the use of any injection therapy (epidural, facet joint, local trigger point) for subacute low back pain without radicular pain	High Quality
Related Evidence Statement: <i>A high quality meta-analysis provides additional good evidence against the use of lumbar facet or epidural injections for relief of non-radicular low back pain</i>						
Storheim et al. 2003	Group training versus cognitive intervention	Randomized clinical trial	N=93. Mean age. General practitioner's office in 2 counties in Norway	Pain (two VAS scales), disability (RMDQ), and sick-listing	The cognitive group improved in disability, the exercise group improved in pain, but none of the interventions decreased sick leave time.	Adequate
Related Evidence Statement <i>There is good evidence that cognitive intervention reduces low back disability in the short term and in the long term. In one of the studies the therapy consisted of 6, 2-hour sessions given weekly to workers who had been sick-listed for 8-12 weeks. Comparison groups included those who received routine care</i>						
Tafazal, et. al.	Corticosteroids	Randomized Clinical	N=150. Mean age 52.	VAS and Oswestry.	Peri-radicular infiltration of steroids appears not to produce any additional	Adequate (additional)

Author/Year	Intervention	Design	Population/Sample/Setting	Main Outcome Measure(s)	Author(s) Conclusion(s)/Discussion	Division Staff Assessment
2009		Trial			benefit compared with bupivacaine alone in patients with sciatica	references; **additional pooling completed).
Related Evidence Statement: Specific to transforaminal injections, there is good evidence that the addition of steroids to a transforaminal bupivacaine injection has a small effect on patient reported pain and disability						
Tilbrook et. al. 2011	Yoga	Randomized clinical trial	N=313. Mean age 46.	Roland Morris Disability Questionnaire	12 weeks of yoga instruction leads to greater improvement in back function than usual care, even though there were no significant group differences in back pain at 12 months	Adequate
Related Evidence Statement: There is some evidence that yoga emphasizing mobility, strength, and posture to relieve pain may be more effective than usual care for chronic and recurrent low back pain						
Trelle et. al. 2011	NSAIDs	Meta-analysis of randomized clinical trials	Patients treated with NSAIDs. -Databases included MEDLINE, EMBASE, and CENTRAL through December 2008, and updated in July 2009	primary outcome was fatal or nonfatal MI	Naproxen seemed the least harmful of the NSAIDs analyzed in the meta-analysis	High Quality
Related Evidence Statement: There is good evidence that naproxen has the least risk for cardiovascular events when compared to other NSAIDs						
Van Kleef, et al. 1999	Radiofrequency lumbar facet denervation	Randomized Clinical Trial	N=31. Mean age 44.	VAS	-Although the study had a relatively small sample, the results show that RF neurotomy can reduce pain in a selected group of patients whose pain arises from the facets-	Adequate
Related Evidence Statement: There is good evidence in the lumbar spine that carefully selected patients who had 80% relief with medial branch controlled blinded blocks and then had RF neurotomy will have improved pain relief over 6 months and decreased impairment compared to those than those who had sham procedures						
VanTulder, et al. 2003 <i>Cochrane Collaboration</i>	Muscle relaxants	Meta-analysis of clinical trials	Patients diagnosed with non-specific low back pain.	VAS; functional scale; return to work, physiological outcomes	There was strong evidence for significant symptomatic relief and overall	High Quality

Author/Year	Intervention	Design	Population/Sample/Setting	Main Outcome Measure(s)	Author(s) Conclusion(s)/Discussion	Division Staff Assessment
Related Evidence Statement: <i>There is strong evidence that non-benzodiazepine muscle relaxants are more effective than placebo for providing short-term pain relief in acute low back pain</i>						
VanWijk, et al. 2005	Radiofrequency Denervation	Randomized Clinical Trial	N=81. Patients with low back pain in 4 clinics in the Netherlands	Primary outcome measure was a combined outcome measure (COM), which was a combination of (1) change in VAS-back, (2) change in daily physical activity, and (3) use of analgesics	No differences in primary outcome between RF and sham RF were seen at 3 months	Inadequate-overall study was inconclusive
Waseem, et al. 2011	Botulinum Toxin injections	Systematic Review of Randomized Trials	Adults with non-specific low back pain. - Databases included MEDLINE, EMBASE, CINAHL, and the Cochrane Library	Primary outcomes were pain, disability (return to work), overall improvement, back-specific functional status (Oswestry, Roland-Morris),, or well-being (SF-36, Sickness Impact Profile, etc)Risk of bias was judged by the description of randomization, allocation concealment, blinding, dropouts/attrition, intention to treat analysis, similarity of co-interventions	There is a lack of high-quality studies evaluating BoNT for LBP -The current body of evidence does not support use of BoNT for LPB	High Quality [additional reference(s) reviewed]
Related Statement: <i>There is a lack of adequate evidence supporting the use of these injections to lumbar musculature for the relief of isolated low back pain</i>						
Wilkens, et al. 2010	Glucosamine	Randomized Clinical Trial	N=250. Mean age 48. Patients treated for chronic low back pain	Roland-Morris Disability Questionnaire	Glucosamine is not associated with a reduction in low back pain or pain-related disability	High Quality

Author/Year	Intervention	Design	Population/Sample/Setting	Main Outcome Measure(s)	Author(s) Conclusion(s)/Discussion	Division Staff Assessment
Related Evidence Statement: There is good evidence that glucosamine does not improve pain related disability in those with chronic low back pain and degenerative changes on radiologic studies; therefore, it is not recommended for chronic lumbar spinal or non-joint pain						
Williams, et al. 2009	Iyengar yoga	Randomized clinical trial	N=90. Mean age 48. Patients with chronic low back pain. In West Virginia	Oswestry Disability; VAS; Beck Depression Inventory	Iyengar yoga decreases functional disability, pain intensity, and depression in the setting of chronic low back pain	Adequate
Related Evidence Statement: There is some evidence that Iyengar restorative yoga, which avoids back bending, results in improved function and decreased chronic mechanical low back pain						
Operative Treatment						
Anderson, et al. 2006	X-STOP	Two-year follow-up from Zucherman, 2004	93 out of a 100 X-STOP patients.	Zurich claudication questionnaire.	The X STOP implant improves symptoms and physical function for neurogenic claudication from lumbar spinal stenosis with spondylolisthesis, without significantly changing slippage or angulation of the involved segments	Adequate
Related Evidence Statement: There is some evidence that X-STOP spacer (a type of spacer device) is superior to continuing nonoperative treatment after 6 months of conservative care has not resolved neurogenic claudication						
Bailey, et al. 2013	Discectomy	Randomized Clinical Trial	N=727, mean age 42. Undergoing discectomy at 34 centers in USA.	Reoperation Rate. Oswestry, VAS, SF-12	Annular repair with the Xclose™ suture reduces the need for reoperation for recurrent disc herniation; differences were not statistically significant, but clinically positive	Inadequate (other references reviewed)-There are features of the study which may underestimate treatment effect.
Blasco, et al. 2012	Vertebroplasty	Randomized Clinical Trial	N=125, mean age 73. Painful osteoporotic fractures. Barcelona	VAS; European quality of life questionnaire (Qualeffo-41); new vertebral fractures	Vertebroplasty and conservative treatment are associated improvement osteoporotic vertebral fractures over a 1 year follow-up. Occurrence of new fractures strongly associated with vertebroplasty.	Adequate
Related Statement: New vertebral compression fractures may occur following vertebroplasty. One study showed a significant association with an increased incidence in the total number of new vertebral fractures, but when analyzed by the number of patients with new fractures the risk loses statistical significance						
Boonen,	Kyphoplasty	Randomize	N=300, Mean age 73; 21	Physical Component	Balloon kyphoplasty rapidly reduces pain	Adequate in some

Author/Year	Intervention	Design	Population/Sample/Setting	Main Outcome Measure(s)	Author(s) Conclusion(s)/Discussion	Division Staff Assessment
et al. 2011		Randomized Clinical Trial	12 sites in 8 countries treated for vertebral compression fracture	summary of SF-36 at one month, with additional follow-up at one year	and improves function compared to nonoperative management of painful vertebral fractures	respects, inadequate in another. Inadequate regarding ability to conclude advantages are maintained over 2 years (outcomes showing this were secondary and not primary outcomes.
Related Evidence Statement: <i>There is good evidence that kyphoplasty provides rapid improvement in function in the initial months after the fracture as compared to non-operative treatment or analgesics alone.</i>						
Boselie, et al. 2013	Arthroplasty and fusion	Meta-analysis of randomized clinical trials	Multiple Databases: MEDLINE, EMBASE, the Cochrane US FDA database on medical devices, and the System for Information on Grey Literature; resulting in 9 studies with a total of 2400 patients (1262 with artificial disks, 1138 with anterior cervical discectomy.	Quality based on Cochrane Back Review Guidelines; Clinical Relevance was classified according to pooled effect sizes	Clinically relevant difference between arthroplasty and fusion was not seen for primary outcomes. Overall quality of evidence was low to moderate.	High Quality
Related Evidence Statement: <i>There is good evidence that arthroplasty produces greater segmental range of motion after 1-2 years than fusion but its clinical significance is unknown</i>						
Brox, et al. 2003	Lumbar Instrumented fusion; cognitive intervention; exercises	Randomized Clinical Trial	N=64. Mean age 43	Oswestry Disability Score	Difference between fusion surgery and cognitive rehabilitation with exercise was not clinically important or significant. Most cases of chronic LBP can be managed with cognitive intervention and exercise.	Adequate

Author/Year	Intervention	Design	Population/Sample/Setting	Main Outcome Measure(s)	Author(s) Conclusion(s)/Discussion	Division Staff Assessment
Related Evidence Statement: There is good evidence that intensive exercise for approximately 25 hours per week for four weeks, combined with cognitive interventions emphasizing the benefits of maintaining usual activity, produces functional results similar to those of posterolateral fusion in patients with chronic non-radicular back pain and no stenosis or instability after one year.						
Brox, et al. 2010	Posterolateral fusion; cognitive intervention.	Randomized Clinical Trial	N=124; treated for chronic low back pain	Oswestry Disability Score	In patients with chronic low back pain and no previous surgery for disc herniation, lumbar fusion was not superior to cognitive intervention and exercises aimed at relieving symptoms at 4 years. Fusion may be indicated in selected patients with low back pain.	Adequate
Related Evidence Statement: <i>There is some evidence that intensive exercise coupled with cognitive behavioral therapy (CBT) is as effective for chronic un-operated low back pain as posterolateral fusion</i>						
Bystrom, et. Al. 2013	Motor Control Exercises (MCE)	Meta-analysis of Randomized Clinical Trials	Patients 16 and older classified as having chronic or recurrent Low Back Pain. Databases were searched through October 2011 and included PubMed, EMBASE, PEDro, and CINAHL	Quality Rated on the 10-point PEDro scale.	MCE superior to general exercise for chronic recurrent LBP.	Adequate
Related Evidence Statement: <i>There is good evidence that a program of motor control exercises emphasizing the transverse abdominis, multifidi, and possible diaphragm and pelvic floor muscles is at least as effective as general exercise and manual therapy and may be more effective</i>						

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Eccleston, et al. 2009 <i>Cochrane Collaboration</i>	Psychological therapies	Meta-analysis of randomized clinical trials	Databases included MEDLINE, EMBASE, and Psychlit from inception through August 2008. Patients reporting chronic pain (with exclusions)	Quality rating scale designed for psychological interventions for pain was used to assess quality of treatment and risk of bias.	Evidence of effectiveness of CBT and BT is weak; most effect sizes are either statistically non-significant or small. -Behavioral change is complex, and most chronic pain patients have established patterns over a long period of time	Adequate
Related Evidence Statement: <i>good evidence that CBT may reduce pain and disability but the effect size was uncertain</i>						
Fritzell, et al. 2001	Lumbar Fusion vs. Nonsurgical for Chronic LBP	Randomized Clinical Trial	N=294. Mean age-43.	Back pain on VAS	Lumbar fusion can be used to reduce pain and decrease disability in carefully selected and well-informed pts with chronic LBP	Adequate
Related Evidence Statement: <i>There is some evidence that lumbar fusion produces better symptomatic and functional results in patients with chronic non-radicular pain when several months of conservative treatment have not produced a satisfactory outcome.</i>						
Hellum et al. 2011	Disc prosthesis surgery vs. rehabilitation	Randomized clinical trial	N=172. Mean age-41. Patients with degenerative lumbar disc in Norway.	Primary outcome was the Oswestry at baseline, 6 weeks, 3 months, 6 months, 1 year, and 2 years. -Several secondary outcomes	For the main outcome, surgery had an 8.4 point advantage over rehab on the Oswestry score; this is less than the difference of 10 points that that the study was designed to detect There is no general consensus on what magnitude of change in the Oswestry index is clinically important; there is a need for such a consensus	Adequate <i>(additional reference reviewed)</i>
Related Evidence Statement: <i>There is some evidence that disc replacement has a slight advantage over multidisciplinary intensive treatment - 60 hours over 5 weeks</i>						
Jacobs et al. 2013	Total disc replacement	Meta-analysis of randomized clinical trials	Patients scheduled for surgery for degenerative disc disease (DDD). Databases were searched through Dec	Pain, overall improvement, patient satisfaction, disability or general functional measures	Most of the included studies show clinically relevant improvement for both disc replacement and fusion, but show small and clinically non-relevant superiority of disc replacement over	High quality

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			22, 2011, and included PubMed, MEDLINE, EMBASE, BIOSIS, FDA register, clinicaltrials.gov, Web of Science, and references of included studies.		fusion for back pain and disability at 24 months follow-up	
Related Evidence Statement: <i>There is strong evidence that disc replacement is not inferior to fusion at 24 months for relief of back pain, reduction of disability and provision of patient satisfaction</i>						
Jacobs, et al. 2011	Single or double anterior interbody fusion techniques.	Meta-analysis of randomized clinical trials.	Patients scheduled for cervical spine surgery for chronic degenerative disc disease at one or two levels for pain lasting at least 12 weeks - Databases were MEDLINE, the Cochrane Library, EMBASE, and BIOSIS through May 2009	Risk of bias was assessed with the 12 criteria of the Cochrane Back Review Group. - Quality of evidence depended on how many of these six domains were met	No treatment was found to be superior for relief of pain in patients with cervical degenerative disc disease or disc herniation. The only choice which was supported by evidence (low quality) was between iliac crest autograft and a cage	High Quality
Related Evidence Statement: <i>There is some evidence that in cervical fusion for degenerative disease, iliac crest autograft provides greater fusion rates, but cages are a valid alternative as cages result in fewer complications from surgery</i>						
Kallmes, et al. 2009	Vertebroplasty	Randomized clinical trial	N=131. Mean age: 74. Patients treated for osteoporotic vertebral fractures at specialty sites in the US, UK, and Australia.	Group differences in Roland-Morris Disability Questionnaire (RDQ), average back pain intensity	Patients with osteoporotic vertebral fractures experience similar improvement from true and sham vertebroplasty in RDQ and pain scores at 1 month from the performance of the procedure	High Quality
Related Evidence Statement: <i>There is also good evidence that osteoporotic vertebral fractures improve equally with both vertebroplasty and with well-simulated sham vertebroplasty which includes infiltration of the periosteum with local anesthesia</i>						
Klazen et al. 2010	Vertebroplasty vs conservative treatment	Randomized clinical trial	N=202. Mean age 75. Patients treated for osteoporotic vertebral	Pain relief as indicated on VAS	In patients with painful osteoporotic vertebral fractures, those who receive vertebroplasty an average of 5.6 weeks	High Quality

Author/Year	Intervention	Design	Population/Sample/Setting	Main Outcome Measure(s)	Author(s) Conclusion(s)/Discussion	Division Staff Assessment
			fractures at 5 teaching hospitals in the Netherlands.		after symptom onset have faster and greater pain relief than those with conservative treatment	
Related Evidence Statement: <i>There is good evidence that vertebroplasty improves pain scores more rapidly than individualized pharmacological therapy for patients with acute osteoporotic vertebral fractures with effects detectable in the first day and persisting up to one year</i>						
Liu et al. 2010	Balloon kyphoplasty vs. vertebroplasty	Randomized clinical trial	N=100. Mean age 73. University hospital in Taiwan.	VAS	There is little difference in clinical outcome between vertebroplasty and kyphoplasty	Inadequate occurrence of two adjacent level fractures in the kyphoplasty group versus none in the vertebroplasty group is too small a number to justify a comparison of fracture risk. Additional references reviewed.
Oestergaard, et al. 2012	Early Initiation of Rehabilitation after lumbar spinal fusion	Randomized Clinical Trial	N=82. Mean age 52. Patients undergoing rehabilitation following instrumented fusion.	Oswestry Disability	Patients undergoing instrumented fusion did not benefit from early initiation of rehabilitation; the usual 12 week postoperative rehabilitation yielded greater functional mobility and function than the fast track 6 week postop rehabilitation	Adequate
Related Evidence Statement: <i>There is some evidence that it is appropriate to defer active rehabilitation until 12 weeks as groups beginning at 6 week had worse outcomes</i>						
Ohtori et al. 2011	Single level instrumented posterolateral lumbar fusion with local bone graft vs. iliac	Randomized Clinical Trial	N=82. Mean age- 40. Patients undergoing posterolateral fusion for lumbar degenerative spondylolisthesis at the University of Chiba in	Clinical: VAS, Japanese orthopedic association score (JOAS). Radiographs.	Rates of bone union and clinical outcomes were similar for local bone graft and for ICBG	Adequate

Author/Year	Intervention	Design	Population/Sample/Setting	Main Outcome Measure(s)	Author(s) Conclusion(s)/Discussion	Division Staff Assessment
	crest bone graft		Japan			
Related Evidence Statement: <i>There is some evidence that anterior interbody cage fusion using rhBMP-2 results in shorter operative time compared with the use of iliac crest bone autograft</i>						
Rousing, et al. 2009	Percutaneous Vertebroplasty compared to Conservative Care	Randomized Clinical Trial	N= 49. Spine center in Denmark.	Pain relief, quality of life	Vertebroplasty comparable to conservative treatment in quality of life; pain.	Inadequate-much essential information is missing.
Rousing et al. 2010	Percutaneous Vertebral Fracture	Randomized Clinical Trial	N=49. Spine Center in Denmark.	Pain relief, quality of life	Vertebroplasty comparable to conservative treatment in quality of life; pain.	Inadequate-much essential information is missing.
Van den Eerenbeemt, et al. 2010	Total Disc Replacement Surgery	Systematic Review of Randomized Clinical Trials	Adults with symptomatic lumbar degenerative disc disease. -Databases were MEDLINE, EMBASE, the Cochrane Library, searched from 1973 through October 2008	Clinical course; effectiveness; safety	There is low quality evidence (based on one study with low risk of bias) that there are no clinically important differences between Charité and BAK cage fusion at 2 years	Adequate
Related Evidence Statement: <i>There is good evidence that the Charite disc is not inferior to allograft fusion with the BAK cage for single level disease and some evidence that the ProDisc is non –inferior to circumferential fusion with iliac crest autograft for single level disease</i>						
Wardlaw et. al. 2009	Balloon Kyphoplasty	Randomized Clinical Trial	N=300. Patients treated for vertebral compression fractures in 8 countries	SF-36 (PCS)	Balloon kyphoplasty improved quality of life, function, mobility, and pain more than nonoperative treatment in the first month of treatment of painful vertebral compression fractures	Adequate
Related Evidence Statement: <i>There is good evidence that kyphoplasty provides rapid improvement in function in the initial months after the fracture as compared to non-operative treatment or analgesics alone</i>						
Wood et al. 2011	Spinal Fusion vs. Structured Rehabilitation	Systematic Reviews of Randomized Clinical trials	Adults with chronic low back pain.	Pain (VAS back/leg), function/disability, satisfaction with treatment, quality of life measures.	-Fusion may offer slightly greater pain and functional benefits over multidisciplinary rehabilitation, but the presence of isthmic spondylolisthesis appears to be an effect modifier; the treatment effects of fusion	Adequate (other references reviewed)

Author/Year	Intervention	Design	Population/Sample/Setting	Main Outcome Measure(s)	Author(s) Conclusion(s)/Discussion	Division Staff Assessment
					are larger when it is present than when it is absent	
Related Evidence Statement: <i>There is some evidence that fusion is likely to have a higher beneficial effect compared to multidisciplinary rehabilitation for patients with isthmic spondylolisthesis, as differentiated from those without the condition who suffered from chronic low back pain</i>						
Zigler, 2007	Pro-Disc Vs Circumferential fusion	Randomized clinical noninferiority FDA Investigational Device Exemption (IDE) trial	N=236. Mean age 39. Patients treated for degenerative disc disease as part of an FDA study	VAS; physical examination; radiographic examination	Compared to circumferential fusion, the lumbar disc implant results in greater overall success with greater range of motion in the operated segment, greater patient satisfaction, and greater willingness to have the procedure again	High Quality; Adequate
Related Evidence Statement: <i>There is good evidence from a comparison of ProDisc-L versus circumferential fusion that arthroplasty is not inferior to fusion and for preservation of motion over fusions</i>						
Zigler et al. 2012	Lumbar total disc replacement	Five-year follow-up of a randomized clinical trial	N=236. Mean age 39. Patients treated for degenerative disc disease as part of an FDA study	physical examination; radiographic examination	-Compared to circumferential fusion, TDR has a statistically significant sparing effect on adjacent-level degenerative disease over a 5 year period	Adequate
Related Evidence Statement: <i>There is some evidence from a five year follow up of ProDisc-L versus circumferential fusion that arthroplasty reduces the risk of adjacent disease. This study found a three times lower rate of new adjacent disc disease for disc replacement (6.7% versus 23.8%). The rate of surgery at an adjacent level did not differ significantly. Both groups improved in most scores similarly</i>						
Zucherman, et. al. 2004	X-STOP interspinous implant	Randomized Clinical Trial	N=200. Mean age 69. Patients treated for lumbar spinal stenosis in the US	Zurich claudication questionnaire.	X STOP is more effective than conservative treatment for lumbar spinal stenosis	Adequate
Related Evidence Statement: <i>There is some evidence that X-STOP spacer (a type of spacer device) is superior to continuing nonoperative treatment after 6 months of conservative care has not resolved neurogenic claudication</i>						
Zucherman, et. al. 2005	X-STOP interspinous implant	Two-year follow-up from previous study	Data available for 93 out of 100 X-STOP patients	Zurich claudication questionnaire.	X STOP is a safe and effective treatment for neurogenic intermittent claudication compared to non-operative treatment	Adequate

Author/ Year	Intervention	Design	Population/Sample/ Setting	Main Outcome Measure(s)	Author(s) Conclusion(s)/ Discussion	Division Staff Assessment
<p>Related Evidence Statement: <i>There is some evidence that X-STOP spacer (a type of spacer device) is superior to continuing non-operative treatment after 6 months of conservative care has not resolved neurogenic claudication</i></p>						

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RISK FACTORS/CAUSATION/PREVALENCE

Author/Year	Exposure/Condition	Design	Population/Sample/Sizing	Main Outcome Measure(s)	Author(s) Conclusion(s)/Discussion	Division Staff Assessment
Coenen, et. Al. 2013	Cumulative Low Back Load as a Risk Factor of Low Back Pain (LBP)	Prospective Cohort Study	N=1086. Mean age-35.6	Cumulative Low Back Load (CLBL) which was calculated over time based on several factors.	CLBL was a significant factor of LBP, but is only shown with highest levels of CLBL.	Adequate (additional reference reviewed)
Related Evidence Statement: <i>There is good evidence that trunk flexion, rotation and lifting in the work place cumulatively is associated with low back pain</i>						
Griffith et al. 2012	Mechanical workplace risk factors and low back pain.	Meta-analysis of individual data and observational studies	Workers in studies which reported workplace biomechanical risk factors in relation to low back pain Databases: MEDLINE 1966-2005, EMBASE 1988-2005, CINAHL 1982-2005, PsychINFO 1974-2005, Safety Science and Risk abstracts 1981-2005, and Institute for Work and Health (Toronto) database	4 Types: pathology, symptoms, functional limitations, and participation/work indicators. -LBP outcomes were grouped into 3 time frame definitions.	-Physical workload as measured by heavy lifting and awkward postures is likely to predict LBP -This relationship is more likely to be observed in younger than in older workers, possibly because of the healthy worker effect, in which vulnerable workers are self-selected out of physically demanding jobs	Adequate
Related Evidence Statement: <i>There is good evidence that trunk flexion, rotation and lifting in the work place cumulatively is associated with low back pain.</i>						
Gross, et al. 2004 (Part 1)	Functional Capacity Evaluation (FCE) for patients with chronic low back pain	Observational prognostic study	N=114. Mean age 41. Patients undergoing FCE in Alberta Canada	Amount of time on temporary total disability (TTD); relationship between failed FCE tasks and TTD.	It is sometimes recommended that RTW be recommended only when a claimant passes all of the tasks on the FCE. -This recommendation would prevent many claimants from returning to work; only 4% of the claimants achieved the goal of passing all FCE tasks, but nearly all of them closed their claims and terminated TTD benefits during the year following	Adequate

Author/Year	Exposure/Condition	Design	Population/Sample/Sizing	Main Outcome Measure(s)	Author(s) Conclusion(s)/Discussion	Division Staff Assessment
					their FCE	
Related Evidence Statement: <i>There is some evidence in chronic low back pain patients that (1) FCE task performance is weakly related to time on disability and time for claim closure and (2) even claimants who fail on numerous physical performance FCE tasks may be able to return to work</i>						
Gross, et al. (Part 2)	Functional Capacity Evaluation (FCE) for patients with chronic low back pain	Observational prognostic study	N=114. Mean age 41. Patients undergoing FCE in Alberta Canada	Amount of time on temporary total disability (TTD); relationship between failed FCE tasks and TTD.	Contrary to expectations, better performance on FCE tasks was associated with higher risk of recurrence	Adequate
Related Evidence Statement: <i>There is some evidence that an FCE fails to predict which injured workers with chronic low back pain will have sustained return to work</i>						
Hoogendoorn, et al. 2002	High physical work load, low job satisfaction	Prospective Cohort Study	N=732. Mean age 36.4. Workers experiencing absence from work	Number of sickness absences from low back pain lasting at least 3 days.	-Trunk flexion, trunk rotation, and lifting at work were associated with an increased risk of work absence due to back pain. -No increase in risk was found with increased frequency of lifting, or with increasing weight of the load being lifted	Adequate
Related Evidence Statement: <i>There is good evidence that trunk flexion, rotation and lifting in the work place cumulatively is associated with low back pain</i>						
Jarvik, et al. 2005	Incidence of Low Back Pain	Prospective Cohort Study	N=148. Adults free of low back pain.	Pain frequency index (PFI)	Depression was stronger predictor of new LBP than any MRI finding Central stenosis, disc extrusion, and nerve root contact may be risk factors for development of LBP	Adequate
Related Evidence Statement: <i>There is some evidence that extruded discs are uncommon in asymptomatic person and are associated with low back pain; There is some evidence that depression is a more accurate predictor of the development of low back pain than many common MRI findings, such as disc bulges, disc protrusions, Modic endplate changes, disc height loss, annular tears, and facet degeneration, which are common in asymptomatic persons and are not associated with the development of low back pain</i>						
Kaila-Kangas, et al. 2009	Physical work exposures	Cross-sectional study with retrospective exposure assessment	N=5871. Working-age individuals, between ages 30 and 64. Finland	Sciatica was determined by presence of nerve root entrapment with straight leg raising producing typical radiating pain with less than 60° leg raising,	For both men and women, sciatica was more prevalent in nonworking subjects than in those currently working -Physically heavy work was associated with sciatica, and the relationship was greater for nonworking than for currently working men and women	Adequate

Author/Year	Exposure/Condition	Design	Population/Sample/Setting	Main Outcome Measure(s)	Author(s) Conclusion(s)/Discussion	Division Staff Assessment
				clinical signs of radiculopathy. -Sciatica was classified as definite or possible, both of which were included in the study.	-Long sedentary work was not associated with sciatica	
Related Evidenced Statement: <i>There is some evidence that high physical workloads are associated with sciatica in working populations, either as primary causes or as triggers of the development of nerve root symptoms.</i>						
Kalanithi et al. 2012	Morbid Obesity	Cross sectional study of the effect of morbid obesity on costs and complications of spine fusion	N=84,607 hospital admissions for spinal fusion. California State inpatient databases (CA-SID).	Post-operative complications as identified by ICD-9CM.	Morbid obesity is associated with increased frequency of postoperative complications in patients undergoing anterior cervical and posterior lumbar spinal fusion, and is more predictive of complications than age and medical comorbidities	Adequate (Additional reference reviewed)
Related Evidenced Statement: <i>There is some evidence that morbid obesity increases hospital length of stay, mortality and postoperative complications of spinal fusion surgery and results in concomitant increases in cost</i>						
Palmer, 2012	Whole body vibration	Case-control study	N=237	Roland-Morris	There were no important associations between WBV and LBP but there were associations between LBP and psychosocial risk factors	Adequate. Inadequate on another issue due to assumes that controls were free of LBP without asking them
Related Evidenced Statement: <i>Some evidence that WBV has no important association with disc pathology in the lumbar spine in professional drivers</i>						
Prado-Leon, et al. 2005	Occupational Lifting Tasks	Case-control	N=231. Between ages of 18 and 55. Guadalajara	Lumbar spondyloarthrosis as confirmed by clinical examination, imaging, and diagnostic review	Lifting has an important effect in the development of lumbosacral spondyloarthrosis	Adequate
2 Related Evidenced Statement:						

Author/Year	Exposure/Condition	Design	Population/Sample/Setting	Main Outcome Measure(s)	Author(s) Conclusion(s)/Discussion	Division Staff Assessment
<p>1. There is good evidence that trunk flexion, rotation and lifting in the work place cumulatively is associated with low back pain</p> <p>2. There is some evidence that exposures of seven hours per week or greater, over more than 9.5 years is associated with low back pain in an apparent dose response relationship</p>						
Roffey, et al. 2010	Occupational standing or walking	Systematic Review of Observational Studies	Currently employed workers in a variety of industries. Databases were MEDLINE from 1966 to August 2008, EMBASE 1980 through November 2007, and CINAHL from 1982 to November 2007	Low Back Pain by self-report.	Occupational standing and sitting did not meet accepted criteria for causation with respect to LBP	Adequate in issues related to sitting; High quality on issues related to standing.
<p>Related Evidence Statement: There is good evidence from a systematic review that standing and walking do not cause low back pain, and good evidence that sitting does not cause low back pain</p>						
Weinstein, et al. 2006	Non-operative vs surgical treatment	Randomized clinical trial	N=472. Mean age 42. Patients with lumbar herniated disc	Main outcome measures were changes in the physical function and bodily pain subscales of the SF-36 and the Oswestry Disability Index (ODI)	Both operated and nonoperated patients with lumbar intervertebral disc herniations improved over the two years of the study. Results may not generalize to patients who cannot tolerate 6 weeks of therapy. Results may not generalize to individuals without clear signs of radiculopathy.	High Quality
<p>Related Evidence Statement: There is good evidence that after 6 weeks of active therapy, those patients with persistent radicular leg pain and an image-confirmed disc herniation have better functional outcomes than non-operated patients. This outcome is more likely to be observed within the first 2-3 months after surgery. However non-operative groups also improved significantly over 2 years</p>						
Weinstein et al. 2007	Surgical vs. non-surgical treatment	Randomized clinical trial	N-601. Mean age 66. Patients with lumbar degenerative spondylolisthesis and spinal stenosis	SF 36; Oswestry	As-treated analysis showed that surgery was superior to nonoperative treatment as early as 6 weeks, and this advantage persisted at 2 years. Intention to treat analysis found no significant differences.	High Quality
<p>Related Evidence Statement: There is good evidence that decompression and fusion, with or without instrumentation, of lumbar stenosis with degenerative spondylolisthesis leads to better 2 year outcomes for patients whose symptoms are severe. However, patients who choose non-operative treatment can also expect their symptoms to improve with nonsurgical treatment, and non-operative treatment is acceptable if this is the patient preference</p>						

Author/Year	Exposure/Condition	Design	Population/Sample/Setting	Main Outcome Measure(s)	Author(s) Conclusion(s)/Discussion	Division Staff Assessment
Weinstein, et al. 2008	Non-operative vs surgical treatment	Randomized clinical trial	N=634. Mean age 65. Patients in the US with lumbar spinal stenosis	Primary outcomes were two scales of the SF-36 (body pain and physical function) and the Oswestry Disability Index (ODI),	As-treated analysis showed that surgery was superior to nonoperative treatment as early as 6 weeks, reached a maximum at 6 months, and persisted after 2 years	High Quality
Related Evidence Statement: <i>There is good evidence that surgical treatment leads to better symptomatic and functional outcomes however those with non-surgical treatment may also improve slightly</i>						
Weishaupt, et al. 1998	Intervertebral disc extrusion	Observational Study	N=60. Mean age 35.	Prevalence of lumbar spine abnormalities	Disk bulging, protrusions, and high-signal-intensity zones are common MRI findings of the lumbar spine in asymptomatic individuals younger than 50 years of age. Disk extrusions, sequestrations, nerve root compression, end plate abnormalities, and severe osteoarthritis of the facet joints are rare, and therefore appear to be predictive of low back pain in symptomatic patients	Adequate
Related Evidenced Statement: <i>There is good evidence that in the asymptomatic population, disc bulges, disc protrusions, annular tears, high intensity zone areas, and disc height loss are prevalent 40–60% of the time, depending on the condition, study, and age of the patient</i>						
Willems, et. al. 2012	Spinal Fusion	Systematic review of prognostic studies	Patients undergoing spinal fusion. -Databases were PubMed and EMBASE through November 2010	Outcomes: pain, improvement, work disability, back-specific disability, reported in such a way that a relevant clinical cutoff could be defined and dichotomized into success and failure for the fusion operation	There was risk of bias in most of the selected studies, which precludes firm conclusions from their reported findings	Adequate
Related Evidenced Statement: <i>There is some evidence that provocative discography, facet joint blocks and temporary external transpedicular fixation do not adequately screen patients with nonspecific low back pain for fusion success. The tests tend to be sensitive but not specific.</i>						